

#### ABSTRACT OF THE DISCLOSURE

A collar dielectric process for reducing a top width of a deep trench. A semiconductor silicon substrate has a deep trench and a deep trench capacitor. The deep trench capacitor has a node dielectric formed on the sidewall and bottom of the deep trench, and a storage node formed in the deep trench and reaching a predetermined depth. An ion implantation process is performed to form an ion implantation area on the substrate at the top of the deep trench. Then, the node dielectric is removed until the top of the node dielectric is leveled off with the top of the storage node, thus exposing the sidewall of the deep trench outside the deep trench capacitor. Next, an oxidation process is performed to grow a first silicon oxide layer on the exposed sidewall of the deep trench, in which the first silicon layer is outside the ion implantation area.